# Age model built from planktic foraminifera radiocarbon in the eastern Pacific during the last deglaciation determined from core MAZ-1E-04 collected on cruise MAZ-I aboard the R/V El Puma in April 2015

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**Project**
» Glacial-Interglacial Changes in Oxygen Minimum Zones Using Deep-Dwelling, Low-Oxygen Planktic Foraminifera (OMZ forams)



| Contributors | Affiliation | Role |
|---|---|---|
| Davis, Catherine V. | North Carolina State University (NCSU) | Principal Investigator |
| Glock, Nicolaas | University of Hamburg | Scientist |
| Machain-Castillo, Maria Luisa | Universidad Nacional Autónoma de México (UNAM) | Scientist |
| Ontiveros-Cuadras, Jorge Feliciano | Universidad Nacional Autónoma de México (UNAM) | Scientist |
| Alcorn, Rachel | North Carolina State University (NCSU) | Student |
| Govindankutty menon, Anjaly | University of Hamburg | Student |



**Abstract**
The structure and drivers of oxygen minimum zone (OMZ) evolution in the Eastern Tropical North Pacific (ETNP) are investigated from ~20.7-10 ka using a multi-proxy approach from core MAZ-1E-04 (22°54.29’N, 106°54.59’W; 1463 m depth). Understanding how OMZ vertical structure changed during past glacial/interglacial cycles will help elucidate the drivers and patterns of OMZ expansion/contraction on longer timescales. Here, the age model built from planktic foraminifera radiocarbon and calibrated with marine reservoir ages and the intcal20 calibration curve, is used to investigate multiple geochemical proxies over the last deglaciation. Universidad Nacional Autónoma de México financed ship time and M. Alejandro Rodríguez Ramírez directed the oceanographic campaign to retrieve the core.

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### BCO-DMO Processing Description

2026-01-15:
Dataset is awaiting processing by BCO-DMO.

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## Parameters

*Parameters for this dataset have not yet been identified*

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## Project Information

### Glacial-Interglacial Changes in Oxygen Minimum Zones Using Deep-Dwelling, Low-Oxygen Planktic Foraminifera (OMZ forams)

**Coverage**: eastern Pacific

NSF abstract:

Oxygen minimum zones (OMZs) are naturally occurring regions of low oxygen found across large swaths of the ocean at depths of 100 to 1000 meters below the surface. OMZs play an important role in biogeochemical cycling and ecosystem function and any change in the expanse of their low oxygen waters can have far reaching implications for marine life and valuable fisheries resources. Marine oxygenation is variable on multiple timescales in response to global climate change, with recent observations showing that OMZs have expanded over the past half century. This project will explore promising new geochemical and morphologic proxies applicable to low-oxygen environments in the planktic foraminifer Globorotaloides hexagonus, a unicellular calcifying organism whose fossil record in seafloor sediments is well suited to reconstructing past low-oxygen environments in the water column. The project will focus on the extensive OMZ of the eastern tropical Pacific. The first goal is to evaluate and calibrate the targeted measurements for modern G. hexagonus collected live in plankton tows. The second goal is to apply these proxies to fossil specimens in sediment cores to generate records of glacial-Holocene change. The outcomes will be useable proxies for generating records of the OMZ environment, and a better understanding of how a major regional OMZ changed during the most recent period of rapid climate change. Both outcomes represent important progress towards understanding natural oscillations in the OMZ as well as modeling and planning for a changing OMZ in the face of global climate perturbations. The project will provide opportunities for undergraduate researchers as well as support a female early career researcher.

The marine sedimentary record is the most promising archive from which to reconstruct long term marine oxygenation. However, significant limitations exist in the available proxies for low oxygen marine environments. This project aims to address this need by evaluating and applying a range of promising geochemical (trace element and stable isotope) and morphologic (area-density and porosity) proxies relevant to low oxygen environments in the planktic foraminifer Globorotaloides hexagonus. The project will develop viable proxies based on the morphology and geochemistry of G. hexagonus shells previously collected in depth-distributed MOCNESS (Multiple Opening/Closing Net and Environmental Sensing System) tows from the eastern Pacific. The results from this proxy development in modern shells will then be ground-truthed and applied to two already well characterized sediment cores from the Mexican Margin and Panama Basin that span from the Last Glacial Maximum through the Holocene. The sediment records will be used to reconstruct past conditions in the eastern tropical Pacific OMZ, where significant questions about glacial-interglacial oxygenation persist. This research will lead to a more mechanistic understanding of how OMZs respond to climate more broadly.

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## Funding

| Funding Source | Award |
|---|---|
| NSF Division of Ocean Sciences (NSF OCE) | OCE-2154081 |

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